3.7 Distributive Property

Part 1: DO IT NOW!

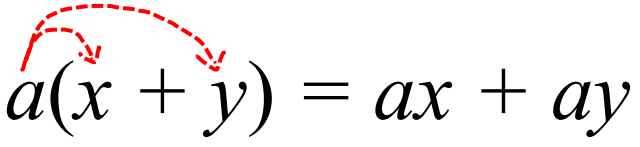
Write a simplified expression for the area of the rectangle:

Remember: Area of a rectangle = length x width.

Area of the rectangle = $5(4x+2)$

Before we can simplify the expression we need to learn the distributive property!

Distributive Property



$$a(x + y) = ax + ay$$

When you apply the distributive property, you are getting rid of the brackets by multiplying everything in the brackets by the term in front of the brackets.

Example:

$$5(4x + 2)$$

$$= 20x + 10$$

To apply the distributive property, I must multiply both terms in the bracket by 5.

Part 2: Multiply a Constant by a Polynomial

Expand and Simplify the Following:

1) $2(5x+3)$

$= 2(5x)+2(3)$

$= 10x+6$

2) $-2(7x-4)$

$= -2(7x)-2(-4)$

$= -14x+8$

Note: Make sure to include the negative sign when distributing the -2. Follow integer rules for multiplication.

3) $-3(2x^2-5x+4)$

$= -3(2x^2)-3(-5x)-3(4)$

$= -6x^2+15x-12$

Note: You can also apply the distributive property to trinomials.

4) $2(6m-3)+3(16+4m)$

$= 2(6m)+2(-3)+3(16)+3(4m)$

$= 12m-6+48+12m$

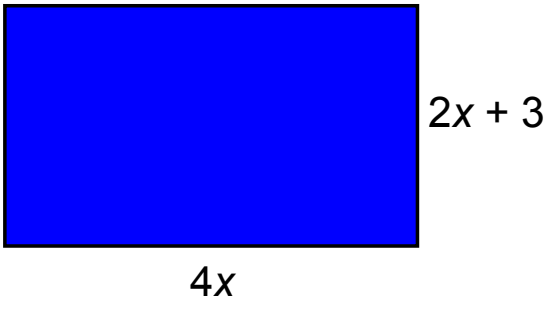
$= 12m+12m-6+48$

$= 24m+42$

Remember: You can collect like terms! Like terms have identical variables (same letters and exponents)

Part 3: Apply Our Knowledge

5) Write an expression for the area of the rectangle in expanded form:



Area = $4x(2x+3)$

$= 4x(2x) + 4x(3)$

$= 8x^2 + 12x$

What is the area of the rectangle if x = 5 cm

Area = $8x^2 + 12x$

$= 8(5)^2 + 12(5)$

$= 8(25) + 60$

$= 200 + 60$

$= 260\ cm^2$

Part 4: Distribute Variables

Example:

$x(x^2 - 3)$

$= x^3 - 3x$

> Remember exponent laws:
>
> $x(x^2) = x^{(1+2)} = x^3$

Expand and Simplify the following:

6) $x(x-3)$

$= x(x) + x(-3)$

$= x^2 - 3x$

7) $-x(7x-4)$

$= -x(7x) - x(-4)$

$= -7x^2 + 4x$

8) $-3x(2x^2 - 5x + 4)$

$= -6x^3 + 15x^2 - 12x$

9) $3m(m - 5) - 1(2m^2 - m)$

$= 3m^2 - 15m - 2m^2 + m$

$= m^2 - 14m$

For this question you can multiply the second polynomial by -1 or use the properties for subtracting polynomials; both give the same result!

10) $\frac{1}{2}(2w - 6) - \frac{2}{3}(9w - 6)$

$= \frac{1}{2}(2w) + \frac{1}{2}(-6) - \frac{2}{3}(9w) - \frac{2}{3}(-6)$

$= \frac{2w}{2} - \frac{6}{2} - \frac{18w}{3} + \frac{12}{3}$

$= w - 3 - 6w + 4$

$= -5w + 1$

Part 5: Nested Brackets

If there is a bracket inside of a bracket, simplify the inner most brackets first and then work your way out.

11) $3[2 + 5(2k - 1)]$

$= 3(2 + 10k - 5)$

$= 3(10k - 3)$

$= 30k - 9$